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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/079,811	02/22/2002	Andrew Mark Nightingale	550-318	5550

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EXAMINER

PATEL, SHAMBHAVI K

ART UNIT	PAPER NUMBER
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2128

DATE MAILED: 09/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/079,811

Applicant(s)

NIGHTINGALE ET AL.

Examiner

Shambhavi Patel

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 February 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 February 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 2/22/02.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date: \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

**DETAILED ACTION**

1. Claims 1-16 are pending.

***Priority***

2. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Application No. 0109282.4 filed on 04/12/01.

***Specification***

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.
4. The following title is suggested: Co-Simulation of a System Containing a Hardware Component and a Software Component.

***Information Disclosure Statement***

5. The information disclosure statement filed on 2/22/02 complies with the provisions of MPEP § 609. It has been placed in the application file. The information referred to therein has been considered as to the merits. (see attached PTO-1449 form).

***Drawings***

6. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: page 16, lines 6-7 state: "Figure 9 schematically illustrates a general purpose computer 200 of the type that may be used to implement the above described technique".

7. Figure 9 does not contain a reference number 200.

8. On page 14, lines 10-11, referring to figure 6, state "Within the simulation software a polling loop serves to monitor the start flag using step 26 when it is set".

9. The reference numbers in figure 6 do not include 26. However, step 46 in figure 6 is labeled "Is start variable set?", which is analogous to the description given in lines 10-11.

10. For the remainder of the examination the examiner will assume that the specification mistakenly referred to "step 46" as "step 26".

11. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or

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"New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Objections***

12. Claim 1 recites "hardware stimulator" in line 13. The examiner will assume that this was a misspelling, since the specifications refer only to a "hardware simulator". Thus for the remainder of the examination the examiner will assume that the applicant was referring to a "hardware simulator".

13. Claim 5 recites "said software stimulator" in line 1. Since the parent claim contains only a "software simulator" (claim 3 line 2), the examiner will assume that claim 5 erroneously referred to the "software simulator" as a "software stimulator".

### ***Claim Rejections - 35 USC § 103***

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which

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said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

15. Claims 1, 2, 6, 7-12, 14, 15, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hollander (US Patent No 6,182,258) in view of Platt et al (US Patent No. 5,835,764), herein "Platt".

16. As per claim 1, Hollander is directed to a method of simulating a system having a software component (Hollander Column 10 Lines 24-28) and a hardware component (Hollander Column 10 Lines 24-28), said method comprising the steps of:

- a. Generating with a test controller (Hollander Figure 1 controller 26, Column 4 Lines 66-67, Column 5 Line 1) a software stimulus (Hollander Column 10 Lines 59-61) for said software component and a hardware

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stimulus (Hollander Column 2 Lines 25-27, Column 7 Lines 12-14) for said hardware component;

b. Modeling operation of said software component in response to said software stimulus using a software stimulus (Hollander Column 8 Lines 39-44, Column 10 Lines 51-58);

c. Modeling operation of said hardware component in response to said hardware stimulus using a hardware simulator (Hollander Column 8 Lines 39-44, Column 10 Lines 51-58); wherein

d. Said hardware simulator and said software simulator are linked to model interaction between said hardware component and said software component (Hollander Column 10 Lines 34-49);

17. Hollander fails to disclose a method where said software stimulus (Hollander Column 10 Lines 59-61) is passed to said software simulator (Figure 4 simulator 36) by issuing a remote procedure call from said test controller (Hollander Figure 1 controller 26, Column 4 Lines 66-67, Column 5 Line 1) to said software simulator.

18. However Platt teaches an analogous method where a system call is made to execute a designated program, using the arguments supplied. When a program needs to be executed, the currently executing process makes a system call requesting that the program be executed. The scheduler makes an entry into the entry table and extracts the information needed to execute the program (Platt Column 10 Lines 16-22).

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19. It would have been obvious to one of ordinary skill in the art to combine the teachings of Hollander and Platt.

20. The motivation for doing so would have been to develop a method of communication that exhibits high performance (Platt Column 7 Lines 32-36). While other communication protocols are cumbersome and time-consuming (Platt column 5 lines 12-15), the method disclosed by Platt would overcome those deficiencies.

21. As per claim 2, Platt teaches the use of a shared memory to store and retrieve information needed to execute the program. The user writes the information needed for the program execution to the main memory, and the scheduler extracts the information when it receives the request to execute the program (Platt column 7 lines 1-26). The information needed to execute the program is analogous to the software stimuli in claim 2. The user is analogous to said test controller. The scheduler is analogous to said software simulator. The information extracted by the scheduler is analogous to the software stimuli.

22. As per claim 6, Platt teaches that when a request is made for a program to be executed, the request is in the form of a process. The process consists of the executable program and all the information needed to run the program. The receiver of the request can then send back the appropriate response. (Platt column 9 lines 34-36, column 10 lines 16-22).



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23. As per claim 7, Hollander is directed to the method as claimed in claim 1 wherein said hardware component is a hardware peripheral within a data processing system (Hollander column 11 lines 29-38).

24. As per claim 8, Hollander is directed to a method as claimed in claim 1 wherein said software component is a software driver for said hardware component (Hollander column 11 lines 29-38, column 3 lines 10-13, column 6 lines 22-24).

25. As per claim 9, Hollander is directed to a method as claimed in claim 1, further comprising monitoring modeled signals at an interface with said hardware component that are generated in response to simulation of said software component and said hardware component (Hollander column 4 lines 52-56, column 8 lines 13-17).

26. As per claim 10, Hollander is directed to a method as claimed in claim 9, wherein said modeled signals are monitored for compliance with rules defining permitted values for said modeled signals (Hollander column 8 lines 13-17).

27. As per claim 11, Hollander is directed to a method as claimed in claim 1, wherein said software simulator is monitored to determine coverage of a range of software stimuli that may be applied to said software simulator (Hollander column 5 lines 32-33, column 8 lines 44-67, column 10 lines 51-55).

28. As per claim 12, Hollander is directed to a method as claimed in claim 1, wherein said hardware simulator is monitored to determine coverage of a range of hardware stimuli that may be applied to said hardware simulator (Hollander column 5 lines 32-33, column 8 lines 44-67, column 10 lines 51-55).

29. As per claim 14, Hollander is directed to a method as claimed in claim 1, further comprising monitoring said hardware simulator to detect expected changes of state within said hardware component occurring in response to said software stimulus (Hollander column 10 lines 51-68).

30. As per claim 15, Hollander is directed to a system of simulating a system having a software component (Hollander Column 10 Lines 24-28) and a hardware component (Hollander Column 10 Lines 24-28), said system comprising:

- e. Generating with a test controller (Hollander Figure 1 controller 26, Column 4 Lines 66-67, Column 5 Line 1) a software stimulus (Hollander Column 10 Lines 59-61) for said software component and a hardware stimulus (Hollander Column 2 Lines 25-27, Column 7 Lines 12-14) for said hardware component;
- f. Modeling operation of said software component in response to said software stimulus using a software stimulus (Hollander Column 8 Lines 39-44, Column 10 Lines 51-58);

- g. Modeling operation of said hardware component in response to said hardware stimulus using a hardware simulator (Hollander Column 8 Lines 39-44, Column 10 Lines 51-58); wherein
  - h. Said hardware simulator and said software simulator are linked to model interaction between said hardware component and said software component (Hollander Column 10 Lines 34-49);
31. Hollander fails to disclose a system where said software stimulus (Hollander Column 10 Lines 59-61) is passed to said software simulator (Figure 4 simulator 36) by issuing a remote procedure call from said test controller (Hollander Figure 1 controller 26, Column 4 Lines 66-67, Column 5 Line 1) to said software simulator.
32. However Platt teaches an analogous system where a system call is made to execute a designated program, using the arguments supplied. When a program needs to be executed, the currently executing process makes a system call requesting that the program be executed. The scheduler makes an entry into the entry table and extracts the information needed to execute the program (Platt Column 10 Lines 16-22).
33. It would have been obvious to one of ordinary skill in the art to combine the teachings of Hollander and Platt.
34. The motivation for doing so would have been to develop a system of communication that exhibits high performance (Platt Column 7 Lines 32-36). While other communication protocols are cumbersome and time-consuming

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(Platt column 5 lines 12-15), the system disclosed by Platt would overcome those deficiencies.

35. As per claim 16, Hollander is directed to a computer program product of simulating a system having a software component (Hollander Column 10 Lines 24-28) and a hardware component (Hollander Column 10 Lines 24-28), said computer program product comprising:

- i. Generating with a test controller (Hollander Figure 1 controller 26, Column 4 Lines 66-67, Column 5 Line 1) a software stimulus (Hollander Column 10 Lines 59-61) for said software component and a hardware stimulus (Hollander Column 2 Lines 25-27, Column 7 Lines 12-14) for said hardware component;
- j. Modeling operation of said software component in response to said software stimulus using a software stimulus (Hollander Column 8 Lines 39-44, Column 10 Lines 51-58);
- k. Modeling operation of said hardware component in response to said hardware stimulus using a hardware simulator (Hollander Column 8 Lines 39-44, Column 10 Lines 51-58); wherein
- l. Said hardware simulator and said software simulator are linked to model interaction between said hardware component and said software component (Hollander Column 10 Lines 34-49);

36. Hollander fails to disclose a computer program product where said software stimulus (Hollander Column 10 Lines 59-61) is passed to said software

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simulator (Figure 4 simulator 36) by issuing a remote procedure call from said test controller (Hollander Figure 1 controller 26, Column 4 Lines 66-67, Column 5 Line 1) to said software simulator.

37. However Platt teaches an analogous computer program product where a system call is made to execute a designated program, using the arguments supplied. When a program needs to be executed, the currently executing process makes a system call requesting that the program be executed. The scheduler makes an entry into the entry table and extracts the information needed to execute the program (Platt Column 10 Lines 16-22).

38. It would have been obvious to one of ordinary skill in the art to combine the teachings of Hollander and Platt.

39. The motivation for doing so would have been to develop a computer program product of communication that exhibits high performance (Platt Column 7 Lines 32-36). While other communication protocols are cumbersome and time-consuming (Platt column 5 lines 12-15), the computer program product disclosed by Platt overcomes those deficiencies.

40. Claims 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hollander (US Patent No 6,182,258) and Platt et al (US Patent No. 5,835,764), herein "Platt" as applied to claims 1-2 above and in further view of Campbell (US Patent No. 6,408,009).

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41. As per claim 3, Hollander fails to disclose a method as claimed in claim 2 wherein said test controller sets a start flag within shared memory to indicate to said software simulator that said shared memory contains call data specifying a software stimulus be modeled.

42. Campbell teaches a method where a start flag in the program is used to inform the program later on that a condition has been met. In Figure 18, steps 1000, 1002, 1004, and 1020 form that main part of the loop that relies on the start flag. The process starts at step 1000. In step 1002, the start flag is tested to determine whether or not it has been set high. If the start flag has not been set high, it loops back around to step 1002. If it has been set high, the rest of the program may execute, beginning with step 1004, and ultimately ending at step 1020 where the start flag is set low again to indicate that the program is finished executing.

43. It would have been obvious to combine the teachings of Hollander, Platt, and Campbell. Though Hollander and Platt describe a system to co-simulate a hardware and software component using appropriate communication protocols, both fail to teach what will trigger and control the flow of the program.

44. The motivation for doing so would be to incorporate an effective method for determining that the stimulus has been received and therefore the simulation can begin.

45. As per claim 4, a method as claimed in claim 3 wherein said software simulator polls said start flag to determine if there is a software stimulus to be

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modeled is contained in the above combination method of Hollander, Platt, and Campbell. (Campbell Figure 18 steps 1000, 1002)

46. As per claim 5, a method as claimed in claim 3, wherein said software simulator resets said start flag to indicate to test controller that modeling of said software stimulus has been completed is contained in the above combination method of Hollander, Platt, and Campbell (Campbell Figure 18 steps 1020).

47. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hollander (US Patent No 6,182,258) in view of Platt et al (US Patent No. 5,835,764), herein "Platt" as applied to claim 1 above in further view of Harmon (US Patent No. 6,810,373).

48. Hollander fails to disclose a method as claimed in claim 1, wherein said software simulator is an instruction set simulator that serves to model execution of software program instruction by a data processing core.

49. Harmon teaches an analogous method wherein the co-verification environment contains an instruction set simulator (ISS) for representing the operation of the processor (Harmon column 3 lines 6-15). Therefore, the hardware is modeled by the logic simulator while the software is simultaneously modeled by the ISS.

50. At the time of the invention it would have been obvious to combine the teachings of Harmon with the above combination of Hollander and Platt.

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51. The motivation for doing so would have been to increase the performance of the system. By using an ISS, the speed of verification is greatly increased.

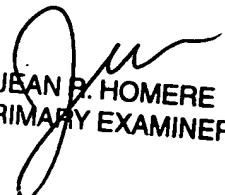
(Platt column 2 lines 66-67, column 3 lines 1-2, 46-57).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shambhavi Patel whose telephone number is 571 272 5877. The examiner can normally be reached on 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jean Homere can be reached on (571)272-3780. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
JEAN B. HOMERE  
PRIMARY EXAMINER